

## **A Method Of Providing Multilevel Quality Signals**

[0001] This invention relates to the provision of signals broadcast in various ways, in which signals are encoded or encrypted for control of access.

### **Background of the invention**

[0002] Broadcast signals or content as for broadcasting movies, sports, music, etc. by radio, cable TV, or satellite are usually sent "Free to air" which is freely available to any receiver, or "subscription", which requires a "payment to view" by a receiver.

[0003] With such schemes, when restricted access is required, encryption of the entire signal occurs. Thus the only receivers which can access the signal are those who have "paid" for access. This can be done by providing a key – either at the sending end or the receiving end. Without the key the signal is completely unavailable to a receiver.

[0004] A typical example is in "Pay TV" where it is arranged that a receiver can pay a subscription fee and is then provided with the facility to decrypt the signal.

[0005] In all such schemes either no useable signal is received, or a full quality signal is received.

### **Summary of the present invention**

[0006] The present invention provides a method for broadcasting a signal at two quality levels simultaneously over a single channel. The signal received by a receiver in one situation will be of low quality but still reasonably acceptable. When provided with a decryption key a high quality signal is received. Thus the "free to air" signal version will be at a low quality level, whereas the "Pay per View" or "Subscription" version will be of a higher quality.

[0007] The two versions of the content are sent in a single program channel, and thus the broadcaster does not need two channels to send the two versions.

[0008] Broadly, the invention is to a method of providing multilevel quality signals, in which a component of the signal is divided out, encrypted and then recombined into a signal having both a high quality and a lower quality level. Typically, in a digital signal having a predetermined sample rate each sample having predetermined bits, a lower bit portion of a sample can be separated out, encrypted and then combined with the rest of the signal. Alternatively separation of a portion of the sample rate could be encrypted. A key is provided for decryption by a receiver.

#### **Description of the preferred embodiment**

[0009] In digital encoding the quality of the translation from analogue to digital is largely determined by two factors:

- the number of bits in the analogue-digital conversion; and
- the sample-rate of the encoding.

[00010] As an example, CD audio is sampled at 44100 samples/second and each sample is 16 bits. Lower sample rates and/or numbers of bits result in lower quality content.

[00011] In the present invention, a signal such as digital audio, would be sampled at the higher rate, then a component separated out (for example the lower 3 bits of the sample). This smaller component would then be encrypted. The two components can then be sent together in a multiplex to the interested party. Without the appropriate decryption key to decrypt the 3 bit portion of the content, the receiver would be forced to provide only a 13 bit audio stream, which would be acceptable, but noticeably less than CD quality.

[00012] For a suitable fee, the receiver would be given the key to decrypt the 3 bit portion of the content, allowing the receiver to reconstitute the full CD quality context.

[00013] The key could be provided to the end user in various ways. For example, the key could be provided either on a "smart card", which would be purchased from any convenient location, or via mail order. Alternatively, by using equipment with the capability to contact a central server (via Internet or phone network and modem for example) the receiver could transfer payment details to the broadcaster and in return the decryption key could be provided to the receiver.

[00014] An alternative, requiring more sophisticated equipment, would allow for separation of a portion of the sample rate, providing another way of reducing the quality of the free to air component of the signal content.

[00015] The invention can be used on traditional broadcast or Internet streamed content.

[00016] The invention enables the normal broadcasting of a signal, at two quality levels simultaneously over a single channel.

[00017] It can be such that at some times a signal can be broadcast at a single level – normally a high level of quality for free to air use, while at other times the signal would be broadcast at two quality levels. Thus, in effect some programs would be free while at certain times some programs could only be received at a high quality on payment of a fee. With the latter arrangement, a lower quality signal would still be available to a user without payment of a fee.

[00018] In another embodiment the signal comprises video image data. Typical video image data includes red green and blue signal contents to provide full colour. If the colour signals are limited to, for example, three bits each, a suitable video image appears for review but the image is clearly not of a quality that compares to television or DVD quality. Thus, for example, a 24 bit colour image would provide 9 bits and the remaining 15 bits of the red, green, and blue signals is encrypted for later decoding. This provides images which are, most often, discernible

but of very low quality. Of course, more bits can be included in the low-quality signal when so desired.

[00019] Typically, since the encoded data was originally within the image, a one to one encoding scheme allows for an image of the same quality over all – once the additional bits are decoded – without requiring any further space.

[00020] Though the description refers to bits, it is also possible to encode the data in other forms and to therefore divide it according to its encoding.

[00021] Numerous other embodiments may be envisaged without departing from the spirit or scope of the invention.